

CLAIMS:

1. A fan with ring comprising:
a cylindrical ring portion (1); and
5 a plurality of blade portions (3) located within the ring portion (1) and projected radially from a boss portion (2) at the center, wherein
the fan with ring comprises connection portions (4) constituted by connecting in one piece
10 part of the front end edge of each of the blade portions (3) with part of the edge of the ring portion (1), and wherein
the blade portions (3), the ring portion (1) and the boss portion (2) are molded in one piece
15 from a press-molded form of a single metal plate.
2. The fan with ring according to claim 1, wherein
the blade surface of each of the blade portions (3) has a sloped plane twisted relative to a plane
20 of the boss portion (2), and wherein
the connection portions (4) at the front ends of the blade portions (3) are formed in one piece such that sloped concave portions (16), that are diagonally depressed, with the edges included in
25 the ring portion, are flush with the sloped planes.
3. A method of manufacturing a fan with ring

comprising the steps of:

plastically working a metal plate into a shallow pan shape so as to form a cylindrical ring portion (1) on the periphery; and

5 forming a boss portion (2) at the center of the bottom portion of the pan shape, slitting and forming blade portions (3) radially from the boss portion (2), and cutting all portions except for part of the front end edge along the radius of each
10 of the blade portions (3) and part of the edge of the ring portion (1) for use as the connection portions (4).

4. The method of manufacturing a fan with ring
15 according to claim 3, comprising, after the step of plastically working a metal plate into a shallow pan shape, the steps of:

 forming the boss portion (2) at the center of the bottom portion of the pan shape, and cutting
20 at least the contours of both edges along the width of each of the blade portions (3) in order to form the plurality of blade portions (3) radially from the boss portion (2); and then

 cutting all portions, except for part of the
25 front end edge along the radius of each of the blade portions (3) and part of the edge of the ring portion (1) for use as the connection portions (4),

and twisting each of the blade portions (3) relative to the boss portion (2) for plastic working.

- 5 5. The method of manufacturing a fan with ring according to claim 3, comprising, after the step of plastically working a metal plate into a shallow pan shape, the steps of:

forming the boss portion (2) at the center of
10 the bottom portion of the pan shape, cutting all the contours of the plurality of blade portions (3) except for both edges along the width and part of the front end portion of each of the blade portions (3) in order to form the plurality of blade portions
15 (3) radially from the boss portion (2), and forming enlarged hole portions (13) for crack prevention at the contour edges of the front end portions; and then

cutting all portions, except for part of the
20 front end edge along the radius of each of the blade portions (3) and part of the edge of the ring portion (1) for use as the connection portions (4), and twisting each of the blade portions (3) relative to the boss portion (2) for plastic
25 working.

6. A method of manufacturing a fan with ring

comprising the steps of:

plastically working a metal plate into a shallow pan shape so as to form a cylindrical ring portion (1) on the periphery;

5 forming a plurality of sloped concave portions (16) for formation of blade portion sloped surfaces on the outer side of the pan bottom, the sloped concave portions (16) being evenly spaced apart from one another along the circumference and being
10 depressed radially from the center of the pan bottom, with the edges of the sloped concave portions (16) included in the peripheries of the pan shape; and

 forming the boss portion (2) at the center of
15 the bottom portion of the pan shape, slitting and forming the blade portions (3) radially from the boss portion (2) such that the sloped concave portions (16) constitute part of the respective blade portions, and cutting all portions, except
20 for the boundary between at least the front edge portion along the radius of each of the blade portions (3) and the ring portion (1) for use as the connection portion, such that the boundary constitutes the sloped concave portion (16) in
25 itself.

7. The method of manufacturing a fan with ring

according to any one of claims 3 to 6, wherein the enlarged hole portions (13) for crack prevention are formed in advance on both ends of the connection portions (4).

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8. The method of manufacturing a fan with ring according to any one of claims 3 to 7, comprising, after the step of plastically working a metal plate into a shallow pan shape, the step of:

10 forming notches (15) in advance from the inside of the pan bottom at the positions of the front end edges of the blade portions (3) at the boundary between the bottom edge of the pan and the periphery of the ring portion (1) of the pan, the
15 notches (15) not stretching to the outer surface of the metal plate.